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AUTHOR Scholes, Gene W.; Chance, Carla S.
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ABSTRACT

The review process conducted by the Information Processing Task Force at Northern Kentucky University is summarized, and eight recommendations are presented that resulted from data analysis, a literature review, information collected from vendors, and an assessment of related activities of other higher education institutions. The review focused on information/word processing needs, equipment configurations, and operational concepts of installation. The task force effort included activity logs for both secretarial/clerical personnel and managerial/administrative personnel, along with questionnaires and interviews to determine work patterns, habits, and cycles. For equipment evaluation, emphasis was placed on mainframe compatibility and multifunctionality. In addition, the costs of word processing systems were assessed by studying a number of configurations: central processor, multifunctional stand alones, shared logic, shared resource, and stand alone. Operational concepts available in information processing were also considered. The recommendations suggest the consolidation of services and the initiation of a new manner of satisfying the information needs of the university by crossing organizational lines to share equipment and communication channels. (SW)

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Assessing the Need for and Initiating Office Automation in the University Setting (Based upon a Report of the Information Processing Task Force of Northern Kentucky University)

Gene W. Scholes
and
Carla S. Chance
Northern Kentucky University
Highland Heights, Kentucky

Contained within this document is a summary of the review process conducted by the Information Processing Task Force and the subsequent recommendations which flowed from an analysis of collected data. The recommendations result not only from analysis of the data, but are based upon a thorough review of current literature, information collected from vendors, and an assessment of related activities at other colleges and universities.

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Assessing the Need for and Initiating Office Automation in the University Setting

Introduction

The purpose of this presentation is to relate the successful experience of Northern Kentucky University in assessing the need for and initiating office automation on its main campus.

Northern Kentucky University is a public institution of higher learning with an enrollment of 10,000 students in sixty-five undergraduate programs, two graduate programs, and one first-professional program. Founded in 1968, the newly built main campus in Highland Heights, Kentucky, in the Greater Cincinnati Metropolitan Area has nine buildings which cost approximately $75 million to construct over the past ten years. With an annual operating budget of $30 million, Northern employs approximately 300 faculty and 450 support staff in seeking to accomplish its instructional, research and public service missions.

During the 1982 academic year, a "Management Review Study of Kentucky's Public Colleges and Universities," was submitted to the Kentucky Council on Higher Education which recommended several strategies to enhance the management of Kentucky's institutions of higher learning. Specifically, the study made the following recommendation for Northern Kentucky University concerning information/word processing.

> We recommend that Northern first conduct a thorough review of its need for word processing equipment throughout the campus and, secondly, identify and evaluate the costs and benefits of alternative word processing systems capable of fulfilling those needs.[1]

A campus-wide Information Processing Task Force (IPTF) was formed at Northern Kentucky University to identify and assess information/word processing needs, compare and evaluate equipment configurations, and recommend the operational concepts of installation. The Task Force completed a well-documented process of assessment which included activity logs for both secretarial/clerical personnel and managerial/administrative personnel as well as questionnaires and interview documents for both of these important user groups. The logs served as actual two-week work measurement documents while the questionnaires were designed to obtain information about working patterns, habits and cycles. The interview document facilitated personalized in-depth feedback and provided a one-to-one information exchange opportunity. This thorough procedure yielded considerable data concerning the office activities carried on within the University setting.

Regarding equipment evaluation, emphasis was placed on mainframe compatibility and upon multifunctionality. In the University setting, equipment potential seemed to be a key factor; not just growth potential but potential for

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[1] Management Review of Kentucky Colleges and Universities, Phase II, prepared by Price Waterhouse and MGT of America for the Kentucky Council on Higher Education, July 8, 1982, p. VI-46.

creativity and flexibility within the architecture of the system. The expressed needs and applications were both numerous and diverse; moreover, these expressed needs seemed to be changing and developing. Systems analysis was based in a philosophy that user needs were controlling factors and the system should fit the need. Individual users were encouraged to exchange routine tasks for the creative challenge of automation.

The initial introduction of office automation in the University setting suggests a pilot program or phase-in scheme. The IPTF recommended that initial installations satisfy three environments: (1) the pure word processing situation which consists primarily of text editing, (2) the information processing situation which requires forecasting and modeling capability, and (3) the data processing situation which involves the creation and storage of records which are vital to a specific area yet cannot be accommodated on the institution's mainframe.

The IPTF attempted to address current University needs, looked at developments in hardware and software which were predicted by vendors and trade journals and considered the future of the University and how its growth and effectiveness might be enhanced by office automation. In addressing the charge to the Task Force, the IPTF looked beyond the acquisition of equipment and considered a possible structure for an organizational unit of word processing, the personnel needed to staff and perform the work of such an area, the physical constraints of configurations which require a hardwired installation, and the policies which affect the determination of word processing as it relates to the mainframe computer which houses administrative data of the University.

The resulting recommendations are in some respects ambitious and, at another glance, very conservative. It was the goal of the IPTF to establish the most advantageous method of entering into the world of office automation. The recommendations suggest the consolidation of services and the initiation of a new manner of satisfying the information needs of the University by crossing organizational lines to share equipment and communication channels. A conservative step into the information processing market is anticipated by limiting initial acquisitions to shared resource or shared logic service facilities with growth potential.

Data Collection and Analysis

The IPTF conducted a two-week data collection period. Prior to the measurement period, information concerning the upcoming process was shared with all units on campus. At the conclusion of the measurement period, IPTF members conducted interviews to gain additional input from the offices on campus.

The IPTF consulted vendors and studied the sample documents available in educational publications and trade journals as part of the process of constructing the survey instruments. Six documents were prepared:

(1) A support staff log which served as a record of activities occurring during the two-week measurement period;

(2) An originator's log which served as a record of activities occurring during the two week measurement period;

(3) A support staff questionnaire which summarized the activities of the units. The questionnaire was completed by the designated lead support staff and addressed peak work-load schedules, crucial tasks, and time frames;

(4) An originator's questionnaire which summarized the activities of the unit and addressed work flow, importance of documents, manner of preparation, and concerns for work flow improvement;

(5) An inverview document which sought information and feedback which may not have been addressed in the measurement process; and

(6) A departmental profile which summarized all of the information collected from the departments. Areas analyzed in the profile included volume of work connected with text preparation, mainframe communications, filing and indexing needs, and CP/M software requirements.

Analysis of the data reflected that much time is wasted in retyping text. As documents go through the revision cycle, secretaries retype entire pages to add or delete text, or in some instances, edit a few words. Because of this complete retype, the document must be reproofed by the secretary and the originator. In those departments not equipped with automated typewriters, repetitive work demands original keyboarding of each item to produce the "original" document required. It was also noted that for many courses banks of test questions which are used frequently could be stored, randomly recalled, and printed. This procedure would free secretaries from the time consuming task of constantly typing and retyping tests. Additionally, vitae and syllabi could be stored, updated as necessary, and recalled for use when applicable. Manuscript preparation and retention could be a service provided through automated office procedures as an aid to scholarly endeavors of the faculty and administration. Administrative office expressed a concern with the cumbersome process required to collect and summarize (list) information and the time consumed in the preparation of handbooks and manuals which are in constant need of update and revision.

The IPTF has made an effort to objectively weigh and consider the information gained from the two-week period and the subsequent interviews. Each member of the IPTF has reviewed all of the interview documents as well as a departmental provile which summarized the data drawn from the numerous forms. However, as is true of any such collection process, there was considerable flexibility in the interpretive process. Nevertheless, a review of the collected data did permit ample opportunity to assess high, medium, and low volume work loads and to identify subsequently the basic needs and potential uses for automated equipment.

Configurations and Market Analysis

The IPTF was charged with identifying and evaluating the costs of word processing systems which might serve the needs of Northern Kentucky University. In fulfilling this charge, a number of configurations were studied:

Central Processor--Currently, limited word processing functions are being performed on the University's academic mainframe. It has been recommended to the IPTF that the University invest in additional terminals and provide all academic departments with access to this mainframe processor. Terminals and modems cost approximately $2,000 each. Hardwired devices are better suited to word processing because of substantially increased transmission speeds. The letter-quality printer that served the mainframe is currently housed within Computer Services; but with the addition of a greater number of remote users, it would be necessary to install remote printers. Printers cost approximately $2,400 each. Mainframe word processing is adequate for those who desire remote dial-up access and who are not constrained by the limitations of available software. The primary advantage of word processing from a central processor is telecommunications access. However, mainframe word processing is less user friendly, has some limited functions, is command intensive, and is not state-of-the-art in word processing.

Multi-functional Stand-alones--Primarily, this configuration consists of personal computers which perform word processing functions via CP/M software. Again, as the name implies, personal computers are computer oriented and command intensive. The IPTF viewed demonstrations of personal computers available through various vendors and concluded that a word processor with CP/M capability offered a much broader functionality and was considerably more friendly. The strength of the personal computer is the ability to manipulate data; unfortunately, in the absence of mainframe communications the user creates his/her own data base which would result in great duplication of effort in the University setting. Information gathered from current periodicals indicates that connecting personal computers to a mainframe in order to share data or download can be expensive in terms of the amount invested in the personal computer. Most personal computers are in the $7,000 range; this figure includes the cost of a dot-matrix printer. Several of these devised interfacing with the mainframe could create a high volume of activity which might be consolidated through the use of other available configurations.

Shared Logic--Many vendors market shared systems which accommodate as few as four peripherals and as many as thirty-two peripherals. The shared logic configuration may function as a mini-computer with word processing capability or as a word processing system with CP/M software capability and mainframe communications. The disadvantage to shared logic is the expense of the main CPU. Costs range from $6,000 for 4.2 megabytes (500 pages) of hard disk storage to $52,000 for 275 megabytes (100,000 pages) of hard disk storage. Additionally, a shared logic system requires extensive hardwire since each peripheral must be hard-wired back to the CPU. Peripherals should be within 2,000 feet of the CPU.

The major advantage of installing shared logic systems includes potential for growth through upgradeability as well as through the addition of peripherals. The average cost of a terminal is approximately $4,500 to $6,500 depending upon terminal memory and other features available; letter-quality printers costs approximately $2,700 to $6,000 based on the print speed. The systems demonstrated for the IPTF can simulate a number of configurations. The terminal loaded with CP/M software and served by a printer located in the same office area serves as a multi-functional workstation (personal computer). In areas where confidentiality is imperative, a terminal and printer can be positioned to simulate a stand-alone unit. With the installation of archiving terminals,

users have the capability of storing information on diskettes instead of utilizing the hard disk storage. While potential growth is the major attraction to shared logic systems, other advantages include the ability to share data between workstations, communication between workstations, and communication between the CPU and the University's mainframe.

Shared Resource--This is perhaps one of the best known and most utilized configurations. A limited number of terminals are hardwired to one printer and for an investment of approximately $30,000 can serve one office, one department, or through a central concept several departments. By utilizing shared resource facilities, the potential for growth is limited. A shared resource system is limited in functionality and serves primarily as a word processor. However, it also represents a lower financial investment. Also, shared resource devices may communicate with the University mainframe through terminal emulation for the purpose of accessing data files.

Stand-alone--This configuration consists of a terminal and a printer and is usually found in the traditional office setting and typically serves just one office. The stand-alone, an investment of approximately $15,000, is basically the same equipment as found in the shared resource system and may have the growth potential for adding terminals to the original terminal and printer. The stand-alone may have communication capability but is usually found in a setting where information is stored on diskettes and is not shared with other systems or with a mainframe.

Operational Concepts--In addition to considering the configurations available, the IPTF has also considered the operational concepts available in information processing. In many instances, the configuration dictates the operational concept. Personal computers are most suited for the professional workstation. Their weakest function is as a word processor and their strength is found in data manipulation and other activities suited for the concerns of managers and executives.

The individual work station and the stand-alone configurations are compatible and resemble the typical traditional office environment.

The concepts most carefully scrutinized by the IPTF were centralized and decentralized operations. Decentralized word processing is performed through shared-resource systems which serve limited areas, through shared-logic systems which are configured as stand-alone units, or through stand-alone units. The concept of decentralized word processing is tied more to the area of service than to the equipment configuration. In a decentralized environment, the area served by the operation is limited to a small group of users, one department, or one office. The centralized concept functions to serve an expanded area, several departments, a building, or an organizational unit. Centralized word processing can be performed on a mainframe, a shared-logic system, or initially through a shared-resource system.

Under decentralized arrangements, existing University personnel would operate the equipment which is placed in the normal office setting. In a centralized arrangement, the equipment would be operated by full-time operators. In a centralized arrangement, the output from equipment, or in other words the return on the investment, is increased significantly because of the constant

day-long usage of the equipment, the increased familiarity with the functions, and the concentrated development of skills. The investment in a centralized concept extends beyond equipment costs and includes personnel costs.

In actuality, the operational concept is in many instances transparent to the user and does not affect the capability or functionality of the terminal. In assessing operational concepts, the IPTF placed significance on the growth potential provided by the various concepts. The decentralized arrangement permits growth through independent acquisitions and does not readily lend itself to mass storage and the sharing of information among multiple users.

Centralized concepts permit a more planned approach to growth. As the demand increased and users demonstrate the need to expand beyond the central operator arrangement, the shared logic system readily permits the addition of terminals and printers in user departments. Many shared logic central processors are equipped with internal operating systems which record and compile information about the amount of time logged on the system and the number of pages of text each user generates. It is a concern of the IPTF that the growth of information processing be a well thought out and planned growth. The means of meeting multiple needs through a single device as well as minimizing the number of users directly interfacing with the University mainframe appear to be worthy goals for information processing as a service area.

Data Downloading

Beyond technical considerations regarding hardware communications between the mainframe computer and various remote devises, which are addressed elsewhere in this report, is the need to obtain actual data from the mainframe. First, it is recognized that numerous selection criteria will need to be applied to a choice of scores of data elements. This is further compounded by the multiple files which might be accessed, ranging from student records and personnel to financial data and combinations from files. Thus, it will be necessary for the University's Computer Services to develop individual computer programs which are designed to abstract data which will meet the needs of the various organizational units or users. Decisions to provide data downloading should be made on a project basis and in accordance with application development priorities as determined by the University's Computer Services Policy Committee. However, it should be emphasized that to avoid data redundancy, duplication of effort, and to maintain data integrity, data must come from a central location.

Hardware Communications

The need on campus for remote hardware communications becomes perplexing when consideration is given to location of files, type of mainframe computer, type of remote device, type of application, data transmission speed, distance between points, physical barriers, and ambiguities about some of these issues when specifics can reduce uncertainty. It would appear that the accommodation of hardware communication should not be addressed for word processing without consideration for instructional information, management information, operational information and other needs.

However, the IPTF has used hardware compatibility with the University's administrative mainframe as a criterion for its recommendations. Moreover, this should be a key consideration in the equipment acquisition process. Implied in the previous discussion of how the issue of communication is perplexing are examples of specifics which should be known before campus-wide communications, or for that matter a single setup, should be designed. For example, it is known that telephone dial-up access can provide a transmission speed which could make this method of access impractical for some applications. Summarily, while there is a risk of being too simplistic, with what indeed is a technical issue, a precise description of how communications might be accommodated is presented as a subsequent recommendation.

Summary and Recommendations

As a summary to the information presented thus far and as a preface to the recommendations which follow, it is appropriate to look closely at the environment in which this report has been formulated. While the IPTF was involved in their activities, the Computer Services Policy Committee, working with an external consulting agency, formulated the following strategy:

> The central processor used to support administrative information processing will not be used as a word processing facility. However, a limited number of administrative offices may justify a need to "down load" data from information files to support word processing activities on a decentralized basis. Thus, communications may be required, in conjunction with administrative information systems, but the host system will not support word processing.
>
> Administrative word processing needs may be fulfilled by a variety of hardware configurations such as: electronic/memory typewriters, stand-alone text processors, shared resource systems, shared logic systems, multi-functional stand-alones or microprocessors, and terminal access to a remote central processor.[2]

Northern Kentucky University had begun to address word processing through some of the hardware configurations listed above before the IPTF began its work. Some faculty projects were already being accomplished via the academic mainframe, several offices have access to electronic typewriters with disk storage and there are several micro-processors using word processing software.

In keeping with the above strategy, the IPTF has determined a method of entering into office automation and bringing together the need for text preparation and information processing. The recommendations and discussions with vendors have centered around the potential for office automation and the enhanced productivity of Northern's staff.

A considerable volume of information on user needs and appropriate equipment acquisitions is available in today's market. The concern of the IPTF is that the operation of the institution not become equipment driven. For this

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[2]"Systems Strategies," Computer Utilization Project, Northern Kentucky University, Fall 1982.

reason, the bases of the recommendations center around the introduction of information processing capabilities beyond those in current existence. Through a Project Director, it is believed that personnel at Northern may become acquainted with the benefits of office automation and the functions available through this advanced equipment. Offices will then be in a position to determine how the equipment will enhance their work rather than arranging to conform to the system.

The IPTF takes the position that word processing as an organizational unit will provide a service for University departments while placing these offices in a better position of assessing the impact that office automation has on the traditional office. The long-range plans for information processing may limit the number of vendors supplying equipment to the University and may look to a communications network. Such plans will be formulated as the University utilizes the equipment acquired as a result of this project. Of concern in the formulation of long-range plans is the objective that data remain secure and reliable and that a variety of configurations and operational concepts be available to information processing users.

The IPTF's efforts serve as a foundation for an area of growth which will significantly affect the creation and exchange of information on the campus and open the way for increased University service to other various constituencies.

Many needs will remain unmet following implementation of the recommendations, particularly in the administrative offices. Various constraints, including funding, force the IPTF to prioritize needs and compromise ambitious plans. It has been the goal of the IPTF to satisfy some of the critical needs expressed in the student service and academic support areas. If additional funding becomes available, additional recommendations for users who currently are able to justify equipment acquisition would be made.

Recommendation I--That an Administrative Support System be established in the University's Administrative Center. This system would consist of a shared logic configuration utilizing a decentralized operational concept. Equipment purchased should contain approximately eight megabytes of hard disk storage and have sufficient ports to satisfy the original peripherals and permit additional users to access the CPU as needs are identified and funding becomes available. The initial users are: student services, alumni affairs, accounting, and university relations. Initially, nine peripherals will serve the Administrative Center.

Recommendation II--That an Administrative/Academic Support System be established in the Chase College of Law. This system would consist of a shared resource configuration utilizing a decentralized operational concept. The shared resource configuration utilizes diskette storage and consists of three terminals and one letter-quality printer. The printer and one terminal are to be located in the administrative area. The remaining two terminals are to be located in academic offices. This configuration is not expandable but will begin to address the various needs of the College of Law which include correspondence with students, test and syllabi preparation, manuscript preparation, as well as provision of some limited administrative support.

Recommendation III--That two Academic Support Facilities be established, one in the Landrum Center and one in the BEP Center. The facilities would be operated by specifically trained word processing operators. The facility located in Landrum would serve the needs of the academic departments in Natural Sciences, Fine Arts, Landrum and the Library. Should additional funding be available, an Academic Support Facility in each of these buildings would be desirable. The facility located in BEP would serve the needs of the academic departments in BEP and the administrative departments in the University Center and the Administrative Center. Both facilities would consist of shared logic configurations and centralized operational concepts. The facilities would provide a service to the user departments which would include manuscript preparation, test and syllabi preparation, special project assistance, handbook and manual preparation, and mass mailing assistance. Each facility would require an initial eight megabytes of hard disk storage and one of the two terminals in each center would need archiving capability for the added protection of confidential information.

Recommendation IV--That a satellite work station to the shared logic configuration in the BEP Center be placed in the offices of the Dean of the College of Arts and Sciences and the Dean of the College of Professional Studies. The needs expressed in this area include text processing, information processing, and mainframe communications. This satellite would consist of two terminals and one letter-quality printer. When Community Research and Services moves to the BEP Center, they should also become a part of the satellite concept and add an additional terminal and printer.

Recommendation V--That a Project Director be named to facilitate and enhance the purchase, installation, and utilization of information processing equipment. Both vendors and users have shared with members of the IPTF their concerns that equipment in the market today is capable of performing far beyond the general level of utilization. Operators normally receive training on the full capabilities of the equipment in the first few weeks following installation. The equipment then enters a period of utilization where many features fall into disuse and both vendors and users seem to fear that the numerous shortcuts available to the operators are forgotten.

The IPTF believes that a Project Director would provide direction and support to operators, would share in the decision making process in prioritizing work, would solicit work from departments reluctant to enter into a centralized environment, would analyze cost/performance factors and would monitor the rate of equipment usage and equipment acquisition as well as monitor the trends in office automation. At this point, the IPTF could assume the postion of advisory panel to the Project Director in developing policies, procedures, short- and long-range goals for the area of word processing at Northern Kentucky University.

Recommendation VI--That the University employ four operators, two for each facility in BEP and Landrum. Additionally, it would be beneficial to employ four work-study students to work in the afternoons and evenings. With consideration for the expense of the equipment and the extensive keyboarding to be accomplished during the first year, student workers would provide an invaluable service.

Recommendation VII--That the University retain a communications specialist for the purpose of "determining a feasible communications network for accommodating the diverse remote access needs on campus." The IPTF recognizes the difficulty

of addressing word processing and its related needs for remote communications without consideration for instructional, operational, management information, and other needs. In order to develop a long-range plan for communication between the mainframe, word processing devices, and other terminals, it will be necessary for the IP Project Director and the Director of Computer Services to work closely with this specialist in the coming year.

Recommendation VII--That the University establish a preferred vendor list based on the following criteria: (1) market strength and growth potential, (2) equipment configuration recommendations, (3) equipment software capabilities, (4) communications capabilities, (5) maintenance/service support, (6) references-evidence of higher education familiarity, (7) special features, (8) educational/training opportunities, (9) functionality.